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# PacketExpert™ – PacketBroker™

(Wire-speed Ethernet Tap)

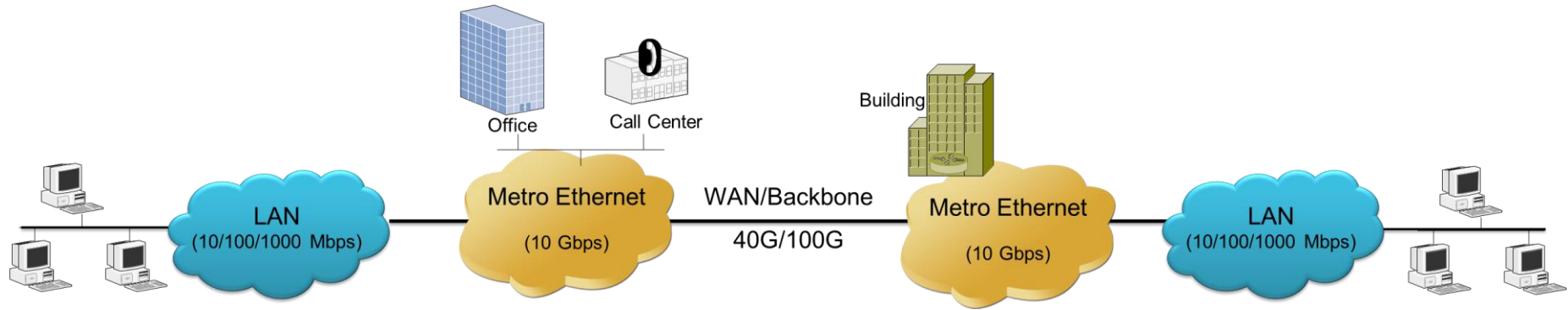
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 **GL Communications Inc.**

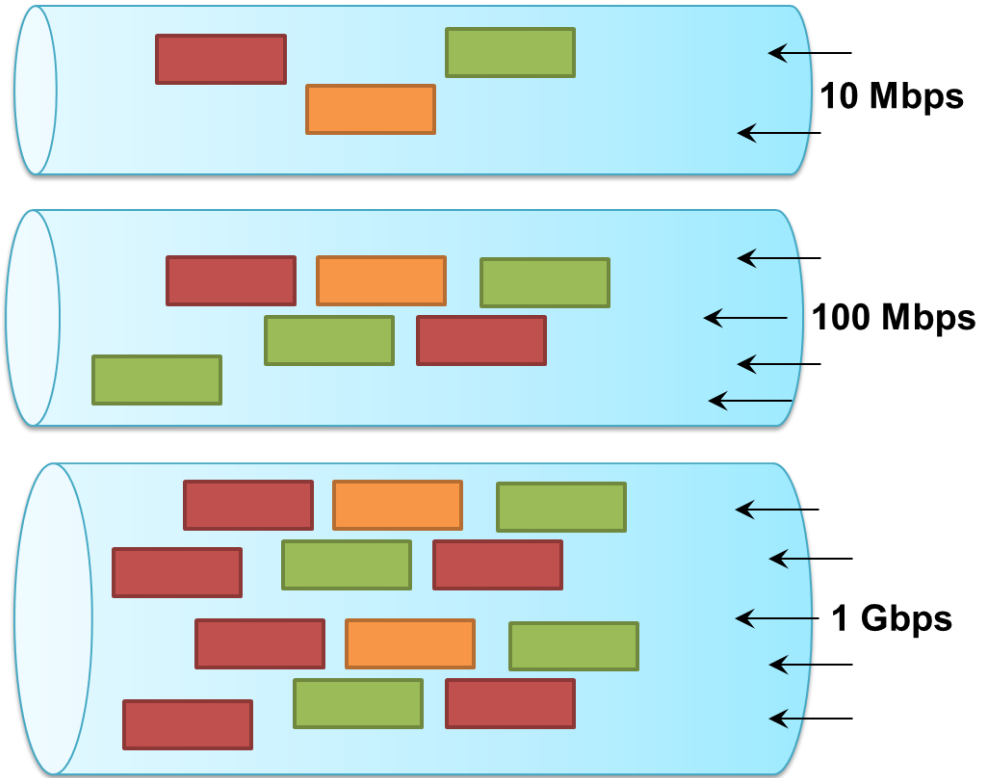
818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878  
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: [info@gl.com](mailto:info@gl.com)  
Website: <https://www.gl.com>

# Ethernet Technology

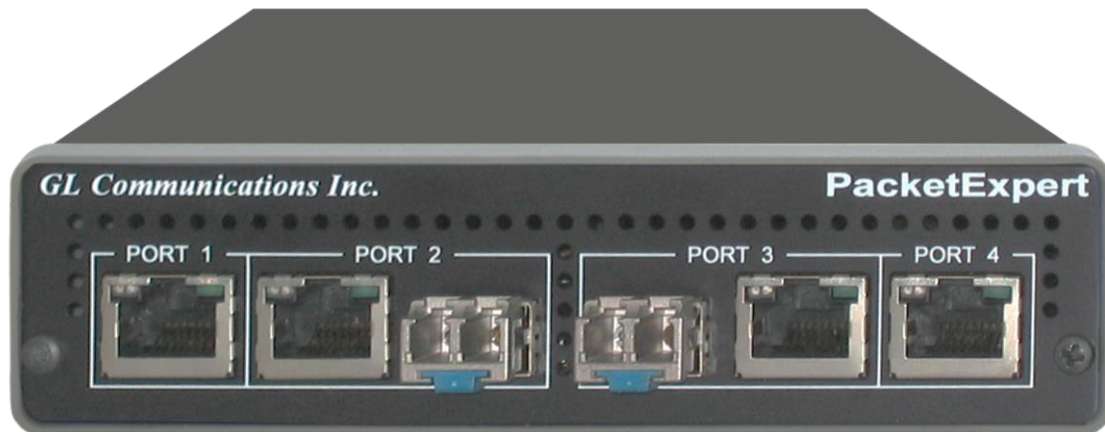


- Ethernet has become ubiquitous in both Local Area Networks and Wide Area Networks
- Network engineers require the ability to capture the traffic at different locations in the network

# Just bigger Pipes, but same Ethernet packets

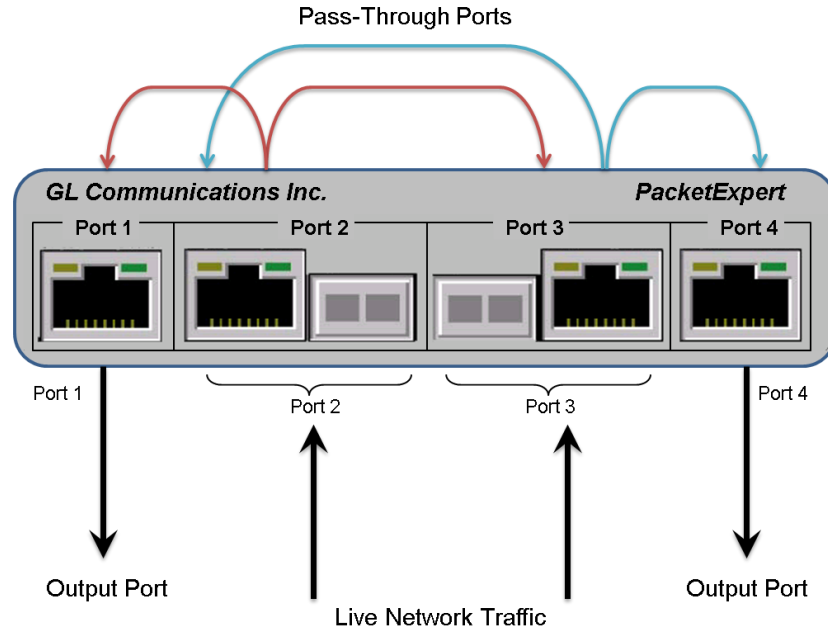


# PacketExpert™ 1G



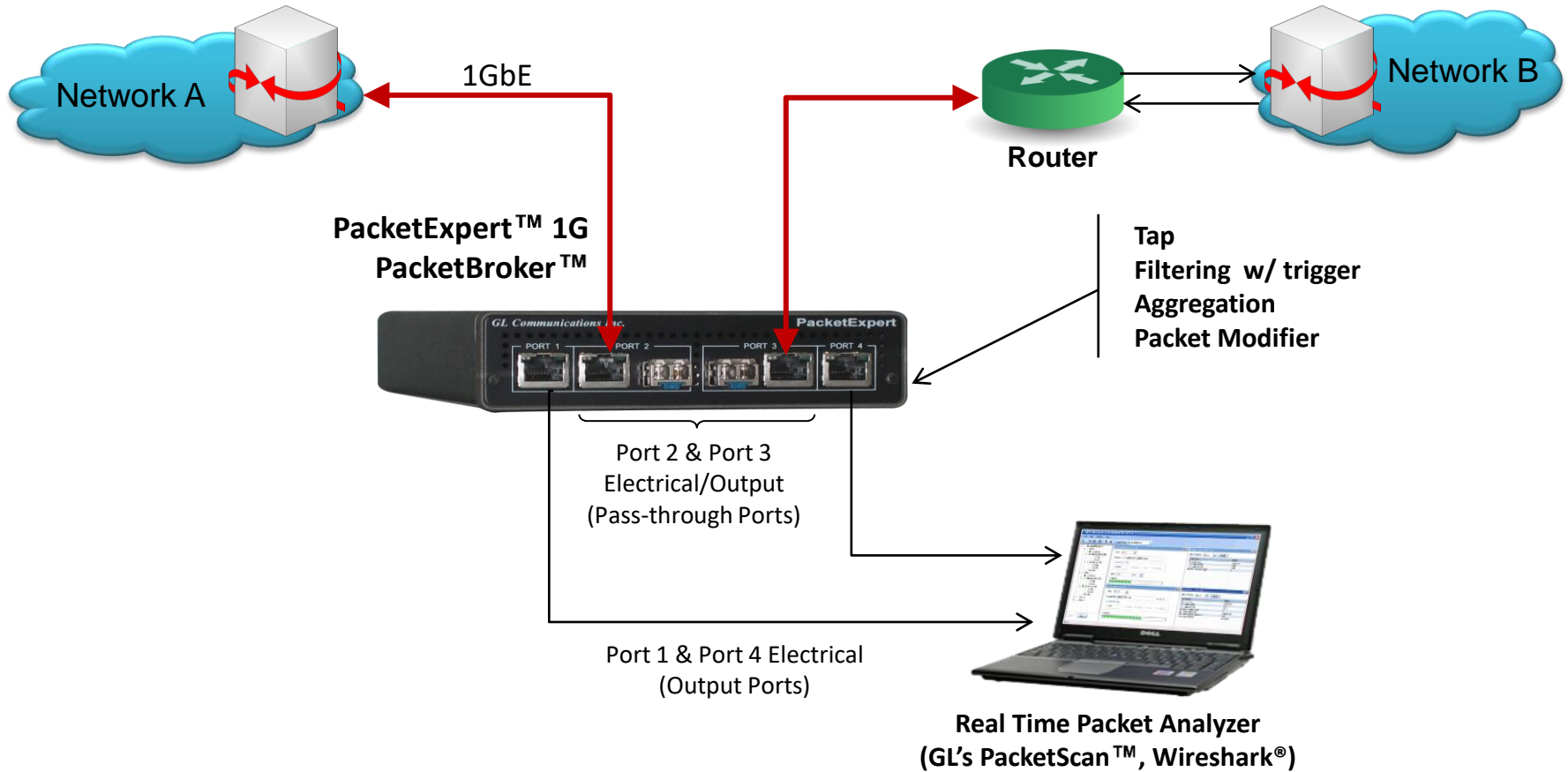
- Bit Error Rate Testing
- RFC 2544
- Smart Loopback Functionality
- ITU-T Y.1564 (verify service level agreements)
- Wirespeed Record/Playback Capability
- Multi-Stream Traffic Generator
- **PacketBroker**
- RFC 6349 (TCP Testing)

# Active Network Tap

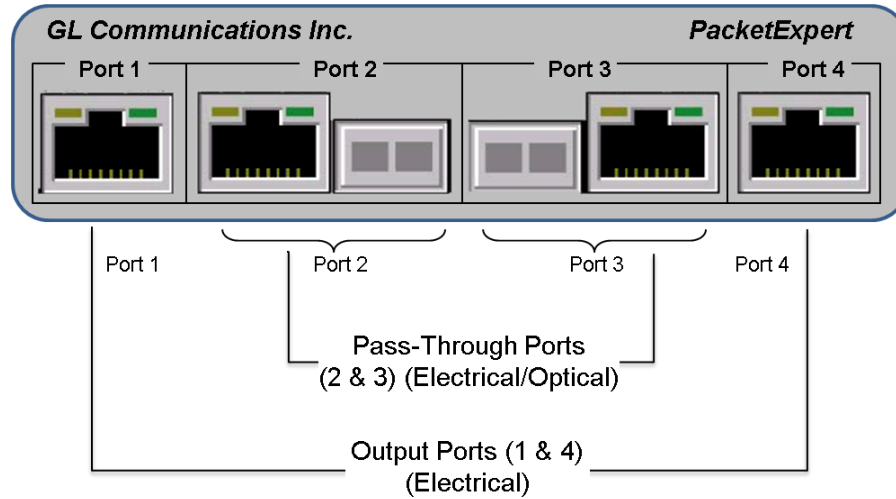


- Dedicated hardware device - FPGA based processing means full 100% wirespeed capability to pass through traffic no drops, no delays, and also to make two separate copies - Tx and Rx side
- Hardware filters means wirespeed filtering

# PacketBroker™ in Network



# Features



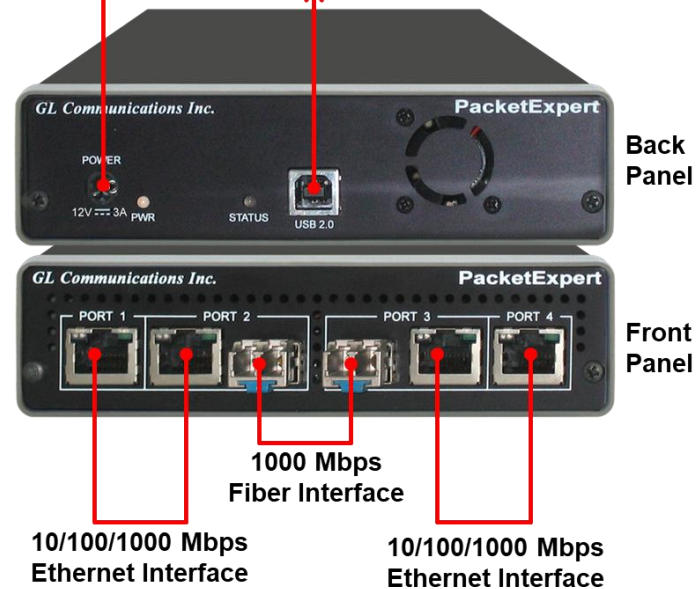
- A network tap like application, with additional advanced features such as:
  - Active network tap - capable of handling bidirectional 100% wirespeed traffic upto 1 Gb/s
  - Wirespeed Filtering - powerful and easy to use
  - Packet Modification to convey useful information such as Timestamp inband
  - Output aggregation - both direction traffic multiplexed on the same output Based on PacketExpert™ hardware platform
- Ports 2 and 3 act as the Active/Pass through ports
- Ports 1 and 4 act as the Output ports

# PacketExpert™ 1G Portable Unit

- Interfaces
  - 2 x 10/100/1000 Base-T Electrical only
  - 2 x 1000 Base-X Optical OR 10/100/1000 Base-T Electrical
  - Single Mode or Multi Mode Fiber SFP support with LC connector
  - Optional 4-Port SMA Jack Trigger Board (TTL Input/Output)
- Protocols:
  - RFC 2544 compliance
  - ITU-T Y.1564 (ExpertSAM)
- Power:
  - +12 volts (Medical Grade), 3 Amps
- Bus Interface:
  - USB 2.0

Power: 12V (Medical Grade), 3A

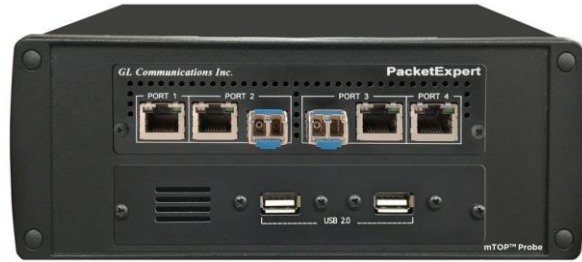
USB 2.0





# PacketExpert™ mTOP™ Probe

Front Panel View



Rear Panel View



- Portable Quad Port Ethernet/VLAN/MPLS/IP/UDP Tester with 4 Electrical Ethernet Ports (10/100/1000 Mbps) and 2 Optical Ports (100/1000 Mbps). Embedded with Single Board Computer (SBC).
- **SBC Specs:** Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro Operating System, USB 3.0 and USB 2.0 Ports, 12V/3A Power Supply, USB Type C Ports, Ethernet 2.5GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports
- Each GigE port provides independent Ethernet/VLAN/MPLS/IP/UDP testing at wire speed for applications such as BERT, RFC 2544, and Loopback. BERT is implemented for all layers.
- RFC 2544 is applicable for Layers 2, 2.5, and 3, and Loopback is applicable for Layers 2, 3, and 4

# PacketExpert™ High Density 12/24 GigE Ports mTOP™ Rack

## PacketExpert™ SA (PXE112)



**PacketExpert™ SA (PXE112)** is a 12-Port PacketExpert™ w/ Embedded Single Board Computer (SBC).

**SBC Specs:** Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro Operating System, USB 3.0 and USB 2.0 Ports, ATX Power Supply, USB Type C Ports, Ethernet 2.5GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports

19" 1U Rackmount Enclosure (If options, then x 3).

## PacketExpert™ SA (PXE124)



**PacketExpert™ SA (PXE124)** is a 24-Port PacketExpert™ w/ Embedded Single Board Computer (SBC).

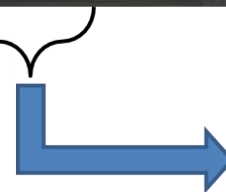
**SBC Specs:** Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro Operating System, USB 3.0 and USB 2.0 Ports, ATX Power Supply, USB Type C Ports, Ethernet 2.5GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports

19" stacked 1U Rackmount Enclosure (If options, then x 6).

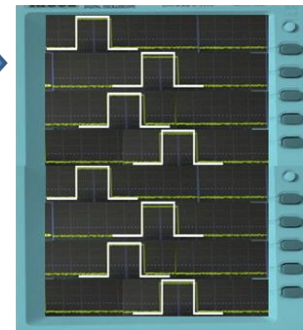
# MTOP™ PacketBroker™ Rack Unit w/ 4 TTL Triggers



TTL Signals



Oscilloscope

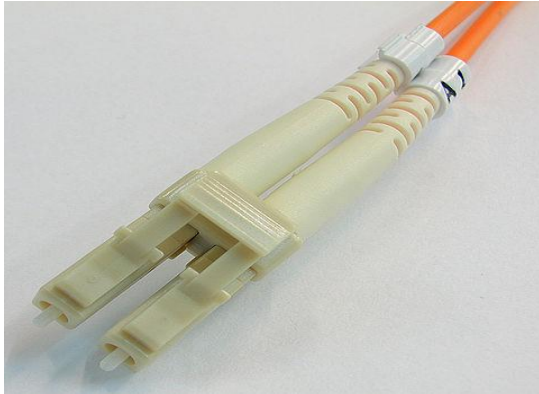


- PacketBroker™ can trigger pulses through TTL ports based on specified Ethernet traffic
- TTL pulses can be received on an oscilloscope for visual analysis of Ethernet traffic

Pulse generated on TTL I/O and is carried over SMA cable to the oscilloscope

# Optical Connectors and SFP Transceivers

## LC Connectors



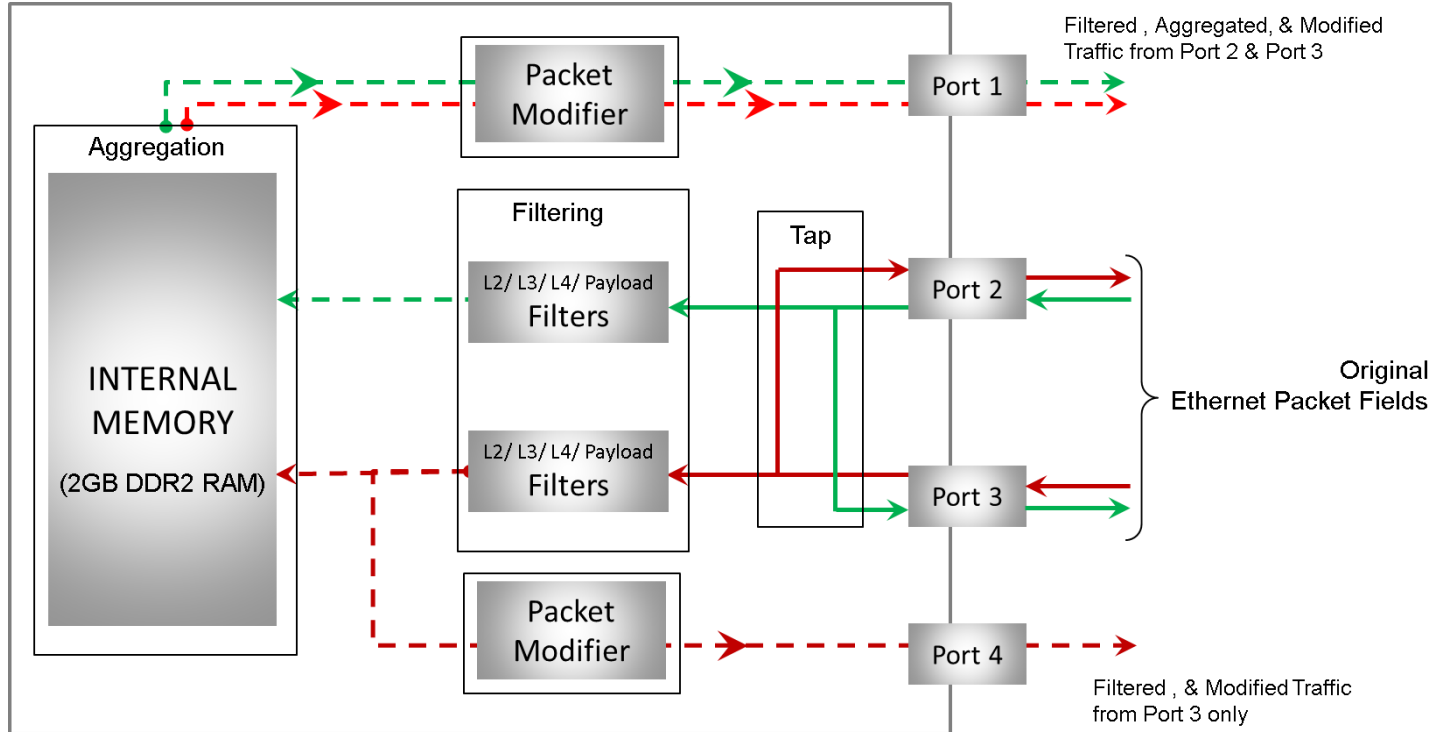
## 850/1310 nm SFP Module



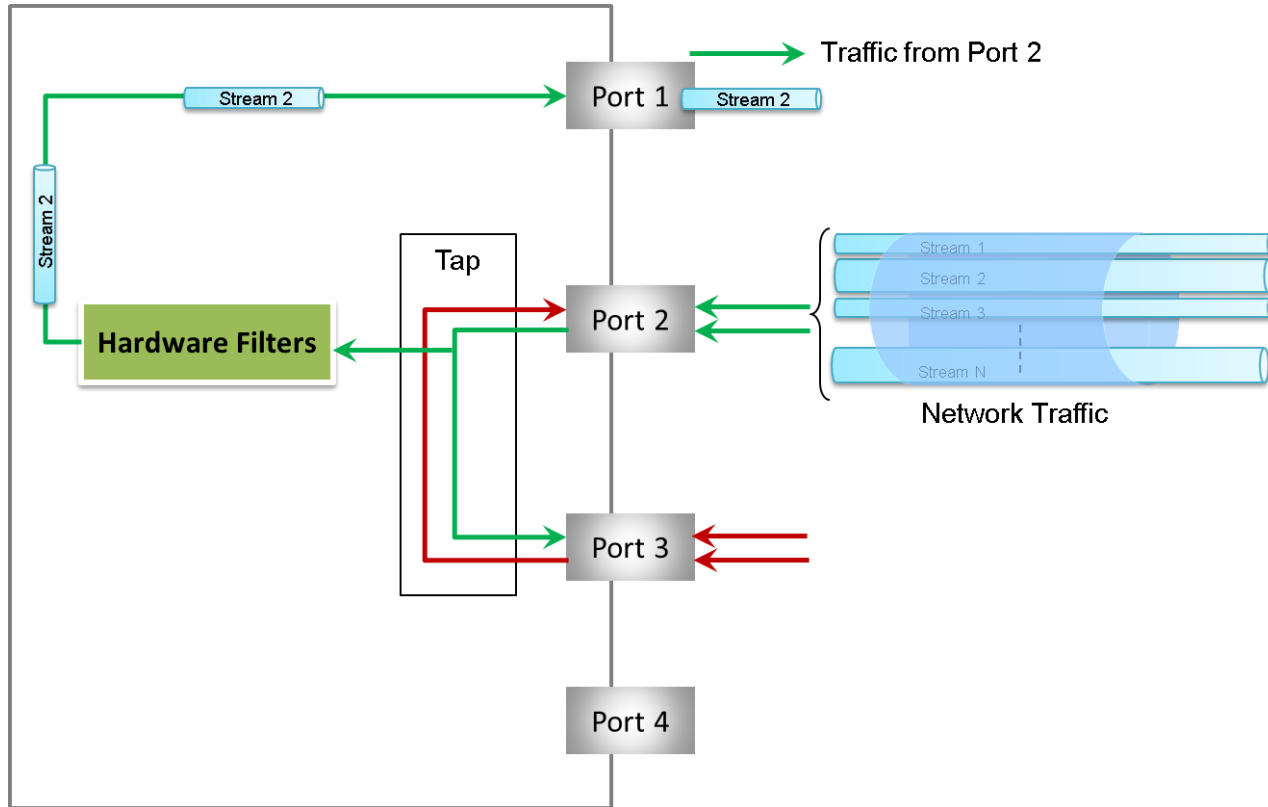
- PacketExpert™ supports LC connectors and 850/1310 nm Small Form-factor Pluggable (SFP) modules

**Note:** In case customer have different type of connectors, then we need converters like LC-to-SC, LC-to-FC and vice-versa

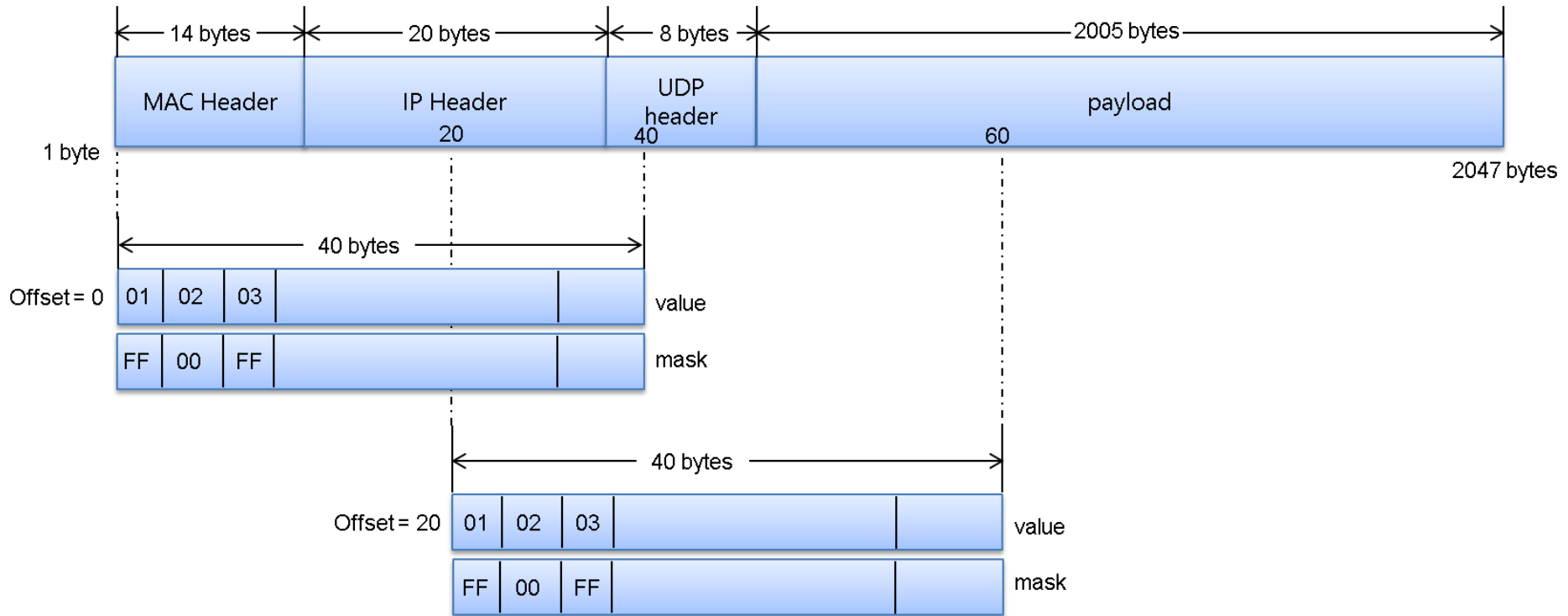
# Packet Tap, Filter, Aggregation, Modification, and Output



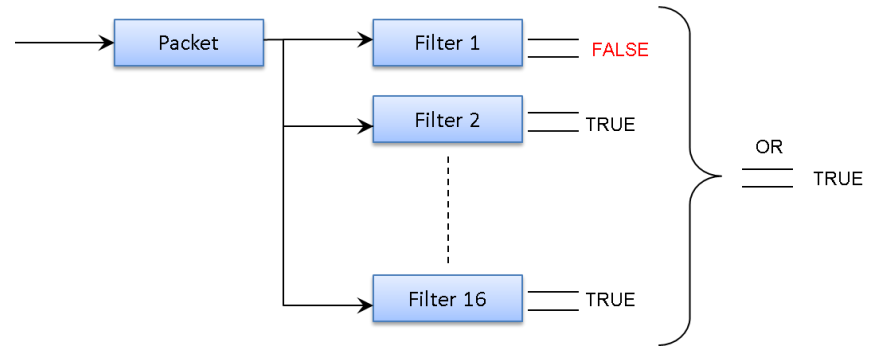
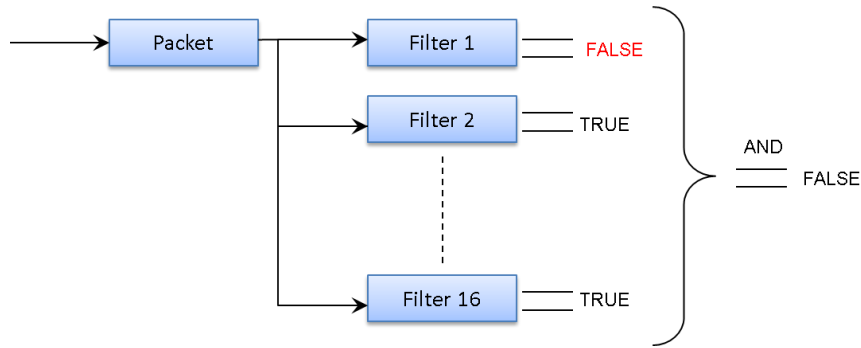
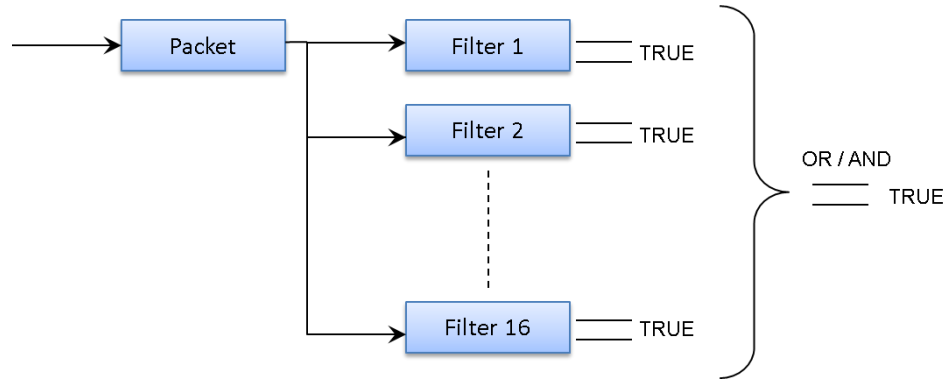
# Capture Traffic of Interest



# Header

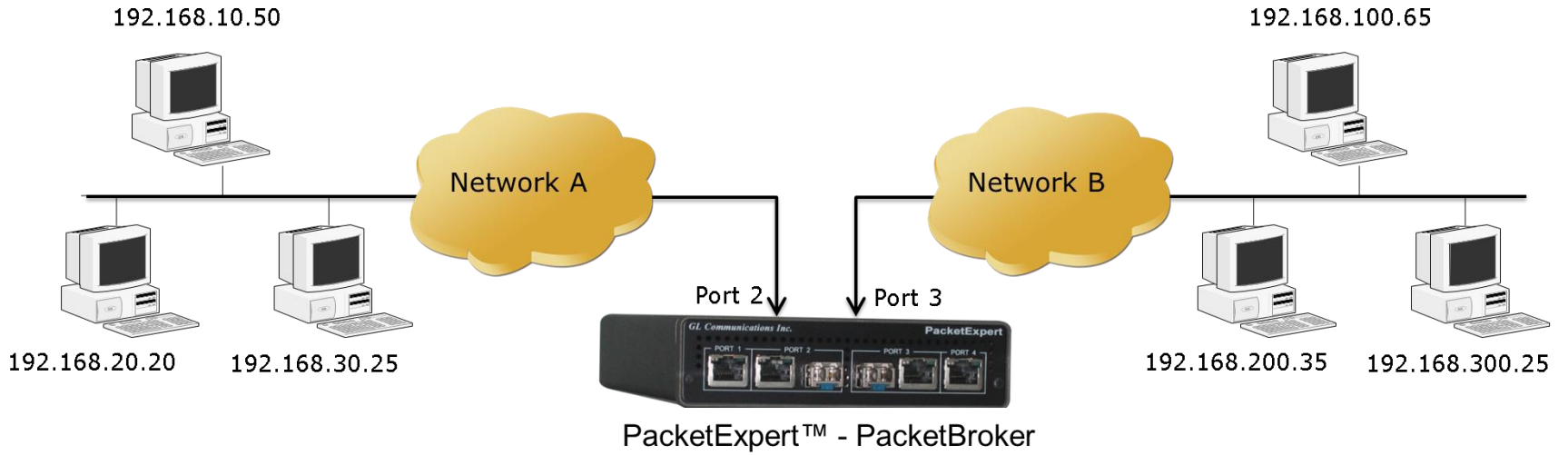


# Filter Combination



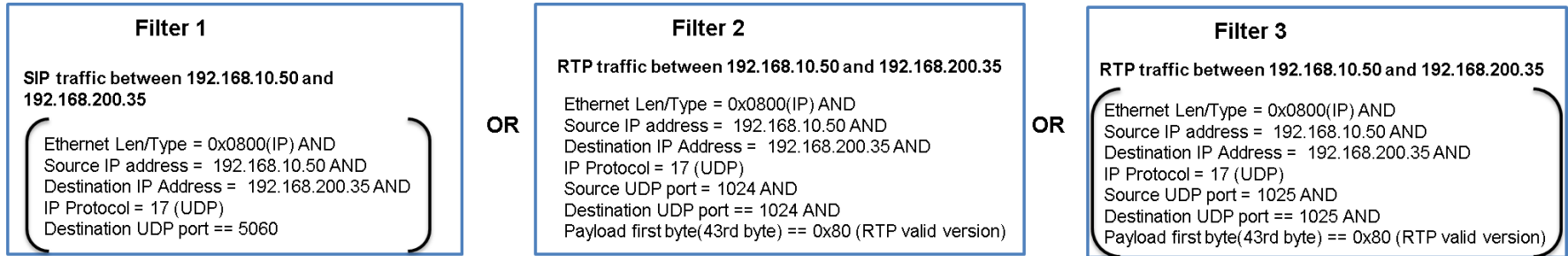


# Filter Example

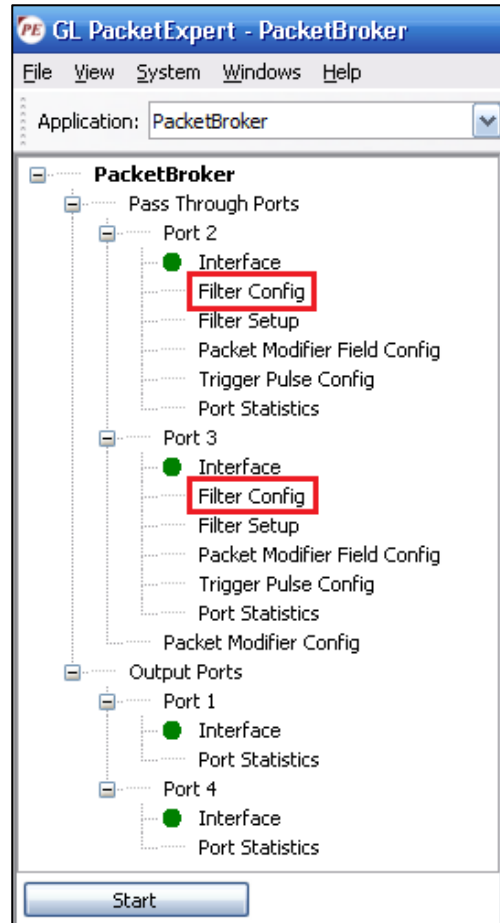


# Filter Example (Contd.)

SIP and RTP between 192.168.10.50 192.168.300.25 unidirectional (192.168.10.50 --> 192.168.300.25)



# Filter Configuration Menu

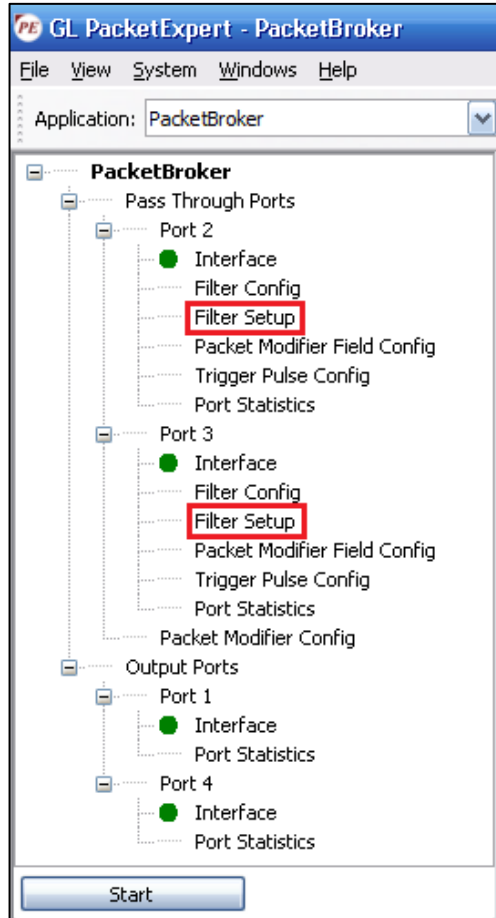


# Filter Configuration Options

The screenshot shows the 'Filter Config' window with the following components:

- Port Selection:** Port 2
- Display Mode:** Raw
- Buttons:** Add, Delete, Copy (From 1 To 1)
- Table:** A table with columns: Filter No., Offset, Type, Bytes 0-7, Bytes 8-15, Bytes 16-23, Bytes 24-31, Bytes 32-39. It contains 5 filter entries.
- Annotations:**
  - A red box highlights the 'Offset' column, with an arrow pointing to the text 'Offset (0-2047)'.
  - A red box highlights the 'Value' and 'Mask' rows for filter 1, with an arrow pointing to the text '40 Bytes Raw Data /Mask Bytes'.
  - A red box highlights the 'Value' and 'Mask' rows for filter 1, with an arrow pointing to the text 'Raw Edit'.
  - A red box highlights the 'Fields' table in the 'Edit' section, with an arrow pointing to the text 'Field Edit'.
- Edit Section:** Filter No. 1, Offset 0, Dst MAC Address, Layer Selection (Layer 2: Ethernet, Layer 2.5: None, Layer 3: IP, Layer 4: UDP).
- Fields Table:** A table with columns: Field, Type, Data, Summary. It lists fields like Dst MAC Address, Src MAC Address, Ether Len/Type, IP Protocol, and Src IP Address.

# Dynamically Enable/Disable Filters



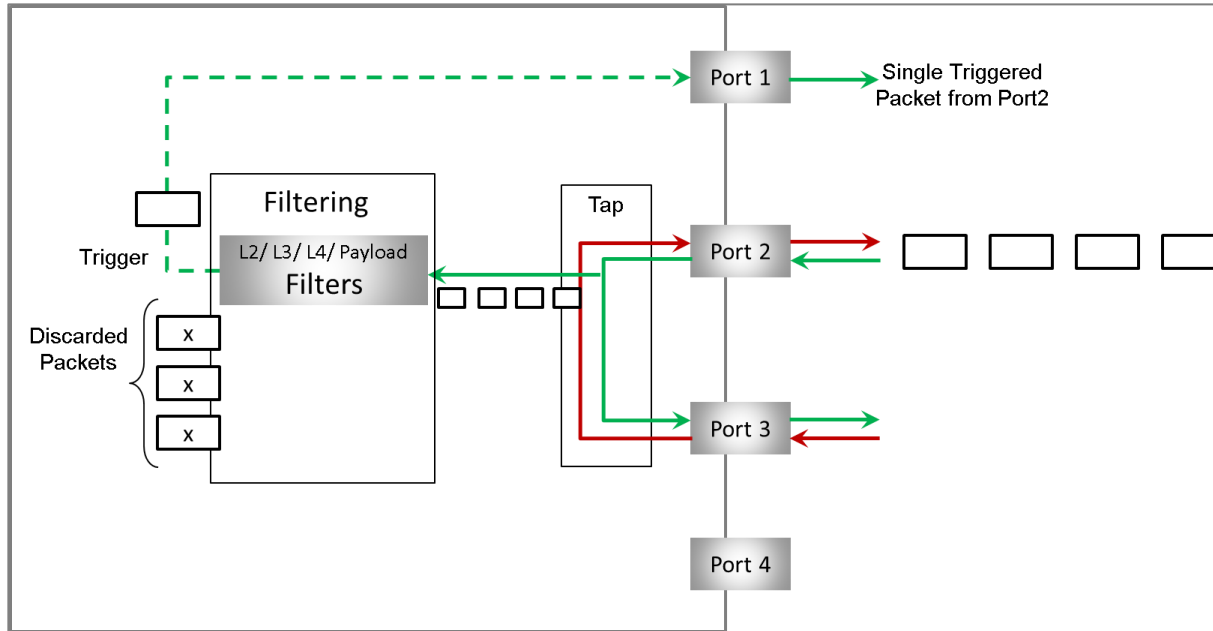
# Dynamically Enable/Disable Filters

The screenshot shows the 'Filter Setup' window. It is divided into three main sections: 'In Ports', 'Aggregator', and 'Out Ports'.  
- **In Ports:** Port 2 and Port 3, each with a 'Filters' dropdown.  
- **Aggregator:** A 'Disabled' dropdown and an 'Output' dropdown set to '1'.  
- **Out Ports:** Port 1 and Port 4, each with a 'Packet Modifier' dropdown set to 'Enabled' and an 'Output' dropdown set to 'Enabled'.  
Below these sections are 'Port Selection' (Port 2), 'Reset', 'Activate All', 'Deactivate All', and 'Operation' (OR).  
A 'Filter Summary' box lists filters F1 through F16.  
At the bottom is a table with columns: Filter No, NOT, Filter Mode, Triggered/Filtered P..., Triggered Status, and Trigger.

Filter No	NOT	Filter Mode	Triggered/Filtered P...	Triggered Status	Trigger
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Continuous	9651		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Continuous	9651		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Continuous	9651		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Continuous	9651		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Continuous	9651		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Continuous	9651		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Continuous	9651		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Continuous	0		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Continuous	0		

Dynamically Enable/Disable Filters, even at run-time

# Trigger Mode



- PacketBroker™ helps achieve this using the Trigger mode for filters
- In this user can start the filter in Trigger mode, where it starts to look for packet matching the user defined value
- As soon as the first packet matches the filter, the filter is set to be triggered, and stops further capture

# Trigger Mode

Filter Setup

Port Selection: Port 2

Filter No	Filter Mode	Triggered/Filtered Packets	Triggered Status	Trigger
<input checked="" type="checkbox"/> 1	Continuous	4382		
<input checked="" type="checkbox"/> 2	Mono Trigger	0	Waiting	Set

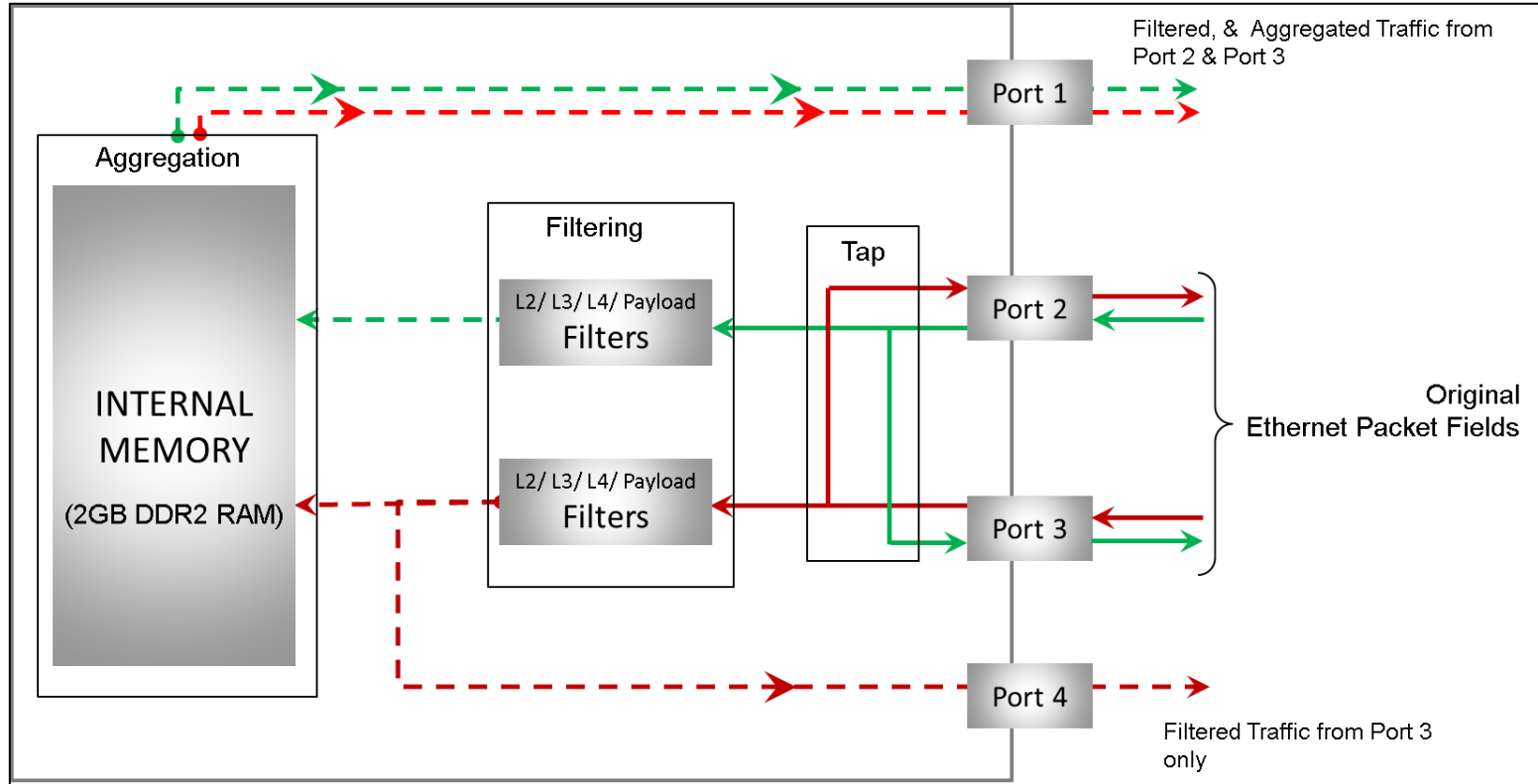
Filter Setup

Port Selection: Port 2

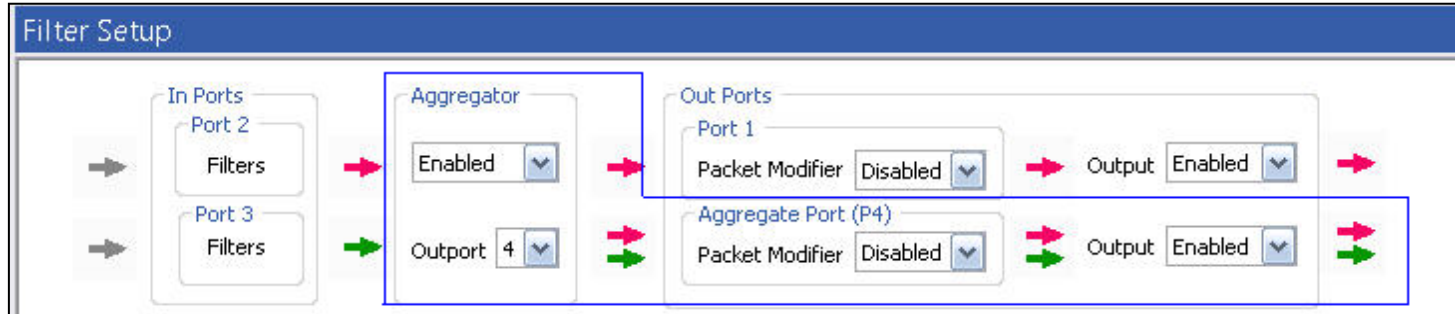
Filter No	Filter Mode	Triggered/Filtered Packets	Triggered Status	Trigger
<input checked="" type="checkbox"/> 1	Mono Trigger	2	Triggered	Set
<input checked="" type="checkbox"/> 2	Mono Trigger	3	Triggered	Set
<input checked="" type="checkbox"/> 3	Mono Trigger	3	Triggered	Set
<input checked="" type="checkbox"/> 4	Mono Trigger	1	Triggered	Set



# Packet Aggregation (Contd.)

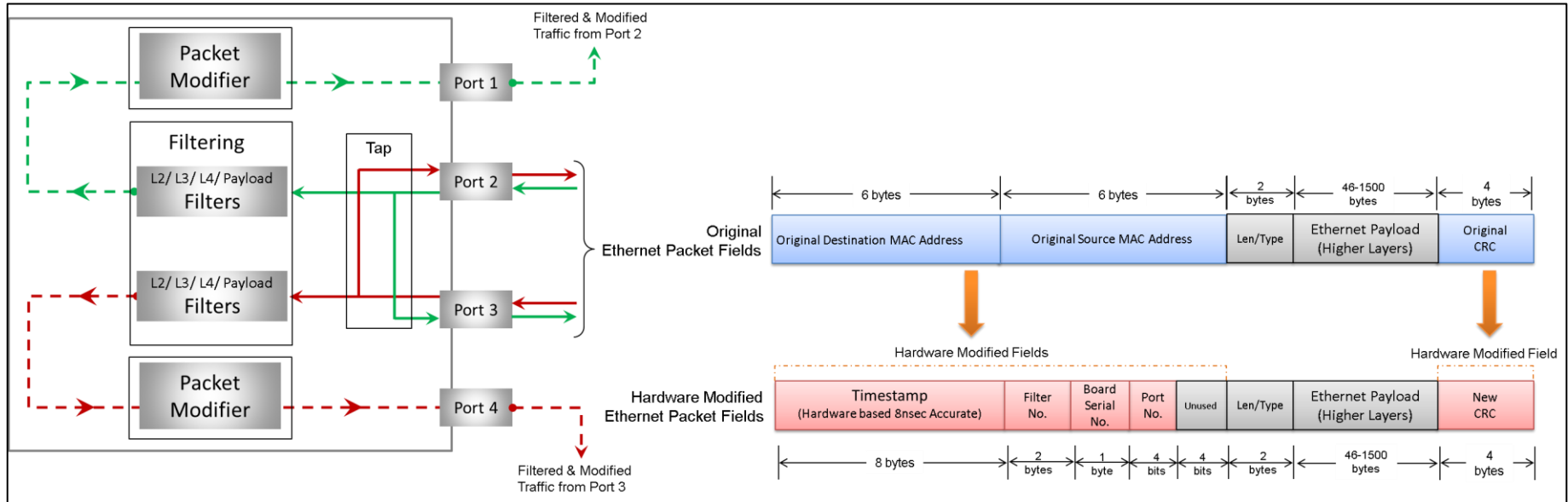


# Packet Aggregation User Interface



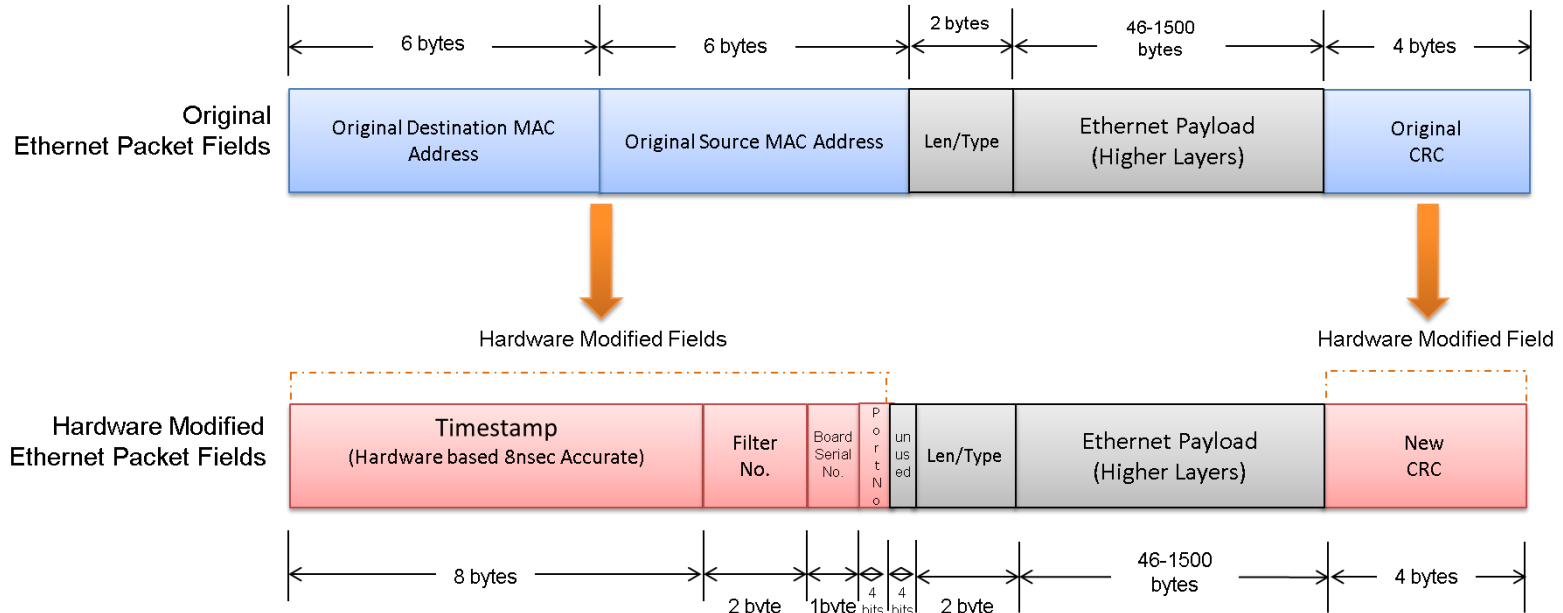
- The filtered traffic is combined and sent out through a single output port
- If the combined bandwidth exceeds the wirespeed of the output port, may cause packet loss
- Hence, the onboard memory (2 GB DR2 RAM) is used as a temporary buffer to store the traffic before sent out at wirespeed. Thus, upto 2 GB of traffic can be buffered

# Packet Modification



- Need to convey very useful information such as the timestamp, port number, filter number etc. to the analysis tool
- May not have the flexibility to convey it outband – may need to do it inband
- PacketBroker™ provides this functionality by conveying it in the MAC header of the output packets

# Packet Modification



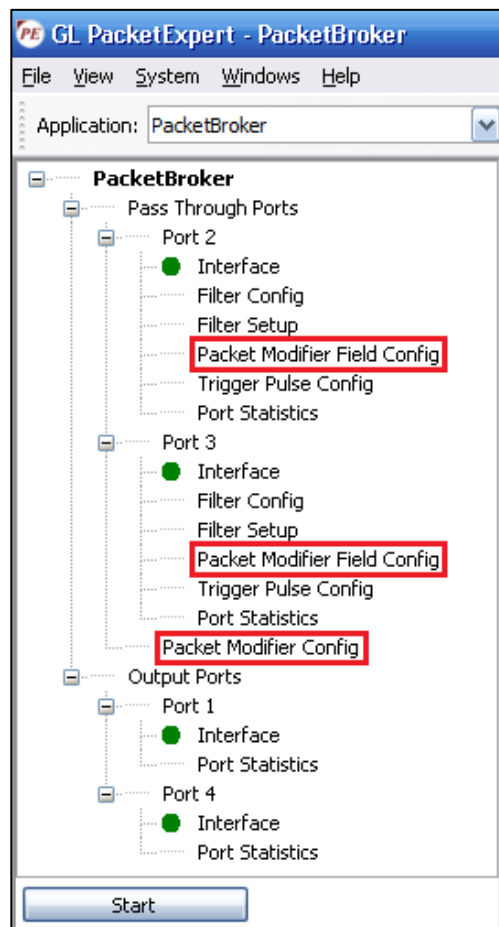
- Timestamp, Filter Number, Board Serial Number and Port Number fields are written on top of the Src MAC address and Dst MAC Address fields
- Ethernet CRC is recalculated
- Original MAC header will be lost, but many times, this may be fine if interest is only in higher layers (IP, TCP/UDP etc.)

# Packet Modifier Enable/Disable

Filter Setup

The screenshot displays the 'Filter Setup' configuration window. It is organized into three main sections: 'In Ports', 'Aggregator', and 'Out Ports'.  
- **In Ports:** Contains 'Port 2' and 'Port 3', each with a 'Filters' dropdown menu.  
- **Aggregator:** Features a 'Enabled' dropdown menu and an 'Outport' dropdown menu set to '4'.  
- **Out Ports:** Contains 'Port 1' and 'Aggregate Port (P4)'. Each has a 'Packet Modifier' dropdown menu and an 'Output' dropdown menu set to 'Disabled'. The 'Packet Modifier' for 'Port 1' is highlighted with a red box and is set to 'Disabled'.  
At the bottom, there is a 'Port Selection' dropdown set to 'Port 2', a 'Reset' button, and two buttons: 'Activate All' and 'Deactivate All'.

# Packet Modifier Field Config Menu



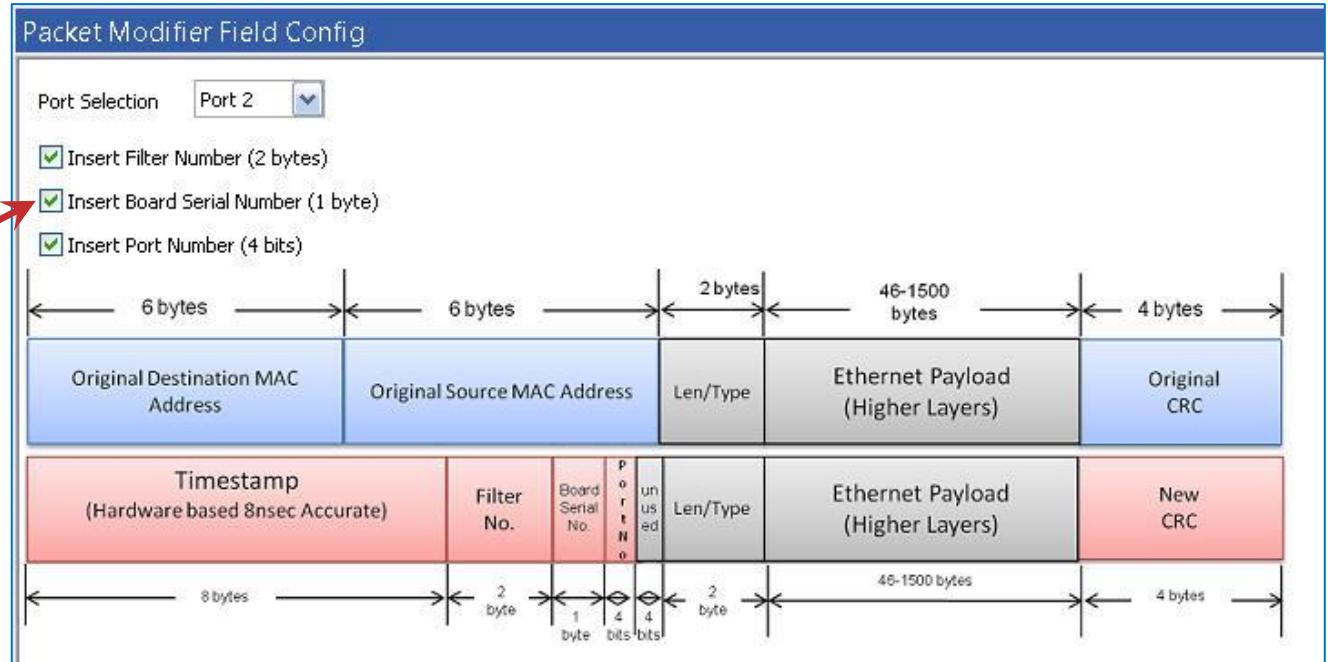
# Packet Modifier Field Configuration

Packet Modifier Config

Board Serial No

Take From Hardware

User Configured  (0-255)



# Packet Modifier Board Serial Number Config UI

Packet Modifier Config

Board Serial No

Take From Hardware

User Configured  (0-255)

Device Information

Number Of Devices: 1

Name	Serial Number	Model Number	USB Type	DDR Module Part Number
Device1	177470	3.0	USB 2.0	-

MAC Addresses

Port #1	Port #2	Port #3	Port #4
00-21-C2-00-09-B0	00-21-C2-00-09-B1	00-21-C2-00-09-B2	00-21-C2-00-09-B3

10G License

Description	Part#	License Type	Licensed Status
-NA-	-NA-	-NA-	-NA-

License Details

Application Name	Part#	License Type	Licensed Status
All Port Bert	PXE100	Basic	-NA-
RFC 2544	PXE100	Basic	-NA-
RFC 2544 (Single Port)	PXE100	Basic	-NA-
All Port Loopback	PXE100	Basic	-NA-
Bert/Loopback	PXE100	Basic	-NA-
Record Only	PXE105	Optional License	✓
PacketBroker	PXE107	Optional License	✓
Playback Only	PXE105	Optional License	✓
Record And Playback	PXE105	Optional License	✓
ExpertSAM	PXE106	Optional License	✓
ExpertTCP	PXE108	Optional License	✓
Multi-Stream Traffic Generator & Analyzer	PXE108	Optional License	✓

OK



# Port Statistics

Port Statistics		
Port Selection	Port 3	Reset
Description	Tx	Rx
Total Frames	5778759	6237864
Valid Frames	5778760	6237864
Number Of Bytes	5287566315	5278880495
Link Utilisation	-	-
DataRate(Mbps)	9.791688	9.673585
Frame Rate(Frames\Second)	1336.481700	2017.709563
Broadcast Frames	0	0
Multicast Frames	5778763	0
Control Frames	0	0
VLAN Frames	0	0
Pause Frames	0	0
Wrong Opcode Frames	0	0
64 Byte Length Frames	0	0
65-127 Byte Length Frames	0	0
128-255 Byte Length Frames	0	222382
256-511 Byte Length Frames	0	0
512-1023 Byte Length Frames	5778770	6015495
1024-1518 Byte Length Frames	0	0
Oversized Frames	0	0
Undersized Frames	-	0
FCS Error Frames	-	0

**Thank you**